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## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

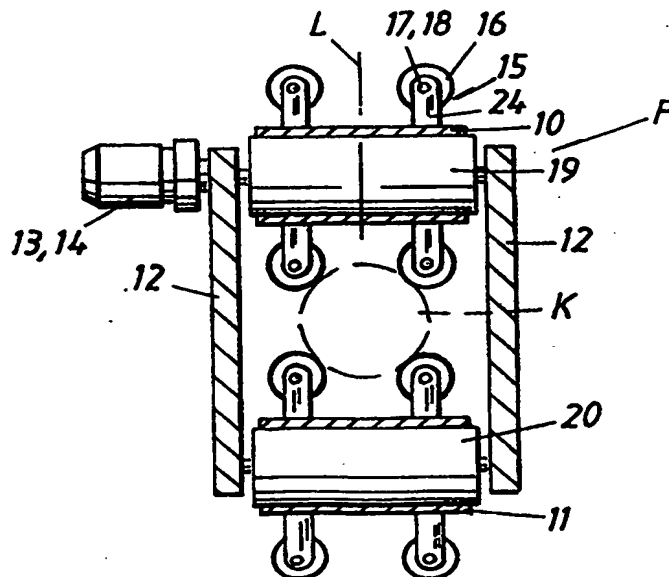
(51) International Patent Classification n <sup>6</sup> : <b>B65H 1/14</b>		A1	(11) International Publication Number: <b>WO 98/33731</b>
			(43) International Publication Date: 6 August 1998 (06.08.98)
(21) International Application Number: PCT/SE98/00172		(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, CZ (Utility model), DE, DE (Utility model), DK, DK (Utility model), EE, ES, FI, FI (Utility model), GB, GE, GH, GM, GW, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).	
(22) International Filing Date: 2 February 1998 (02.02.98)			
(30) Priority Data: 9700365-1                      3 February 1997 (03.02.97)                      SE			
(71) Applicant (for all designated States except US): ASEA BROWN BOVERI AB [SE/SE]; S-721 83 Västerås (SE).			
(72) Inventors; and (75) Inventors/Applicants (for US only): BACKLUND, Alberti [SE/SE]; Orrvägen 2, S-734 37 Hallstahammar (SE). LEIJON, Mats [SE/SE]; Hyvlarvägen 5, S-723 35 Västerås (SE).			
(74) Agent: KARLSSON, Leif; L.A. Groth & Co. KB, P.O. Box 6107, S-102 32 Stockholm (SE).		Published With international search report.	

(54) Title: FEEDING DEVICE AND A CABLE FEEDER INCLUDING SUCH A DEVICE

### (57) Abstract

A feeding device for elongated goods (K) of cable or hose type presents two mutually facing conveyors (10, 11) supported by a number of support and deflecting rollers (19, 20). The conveyor belts (10, 11) support carriers (15) each of which comprises a cylindrical roller (16) supported by a holder (24) secured to the conveyor belt. The longitudinal axis of the roller (16) is parallel to the direction of feed of the conveyor belt (10, 11). The rollers (16) are arranged in pairs on either side of the longitudinal centre axis (L) of the conveyor belt (10, 11). The feeding device has a high friction coefficient in the direction of feed but a low, almost negligible friction coefficient in the transverse direction. Therefore, any twisting in the longitudinal direction of the goods (K) fed may be released. A cable feeder for mounting a cable in a stator includes a feeding device of this kind.

A - A



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## FEEDING DEVICE AND A CABLE FEEDER INCLUDING SUCH A DEVICE

**Technical field**

5 The present invention relates to a device of the type specified in the preamble of claim 1 for feeding elongated goods such as cables, hoses and the like and comprising feeding means arranged in pairs for grasping abutment against the goods to be fed.

10 **Prior art**

When feeding elongated goods such as electric cables or hoses it is often required to achieve absence of twisting of the goods.

15 Examples of known strand feeding devices are disclosed in US-1 904 885 and US-2 251 291. The known devices have a pair of conveyor belts as feeding means. The belts have carriers abutting against the strands as they pass between the conveyor belts.

20 With the previously known feeding devices of the above mentioned kind it has turned out to be difficult to achieve the required absence of torsion.

**Summary of the invention**

25 In order to solve the problems representing an obstacle to torsion-free feeding of elongated goods the device according to the present invention includes the specific fetures specified in the characterizing portion of claim 1.

30 The conveyor belts thus present as carriers two longitudinal rows of holders on either side of the longitudinal axis of the respective conveyor belt. The holders support carrier means for abutment against the goods to be fed. Each carrier means is formed as a cylindrical roller, the longitudinal axis of which is parallel to the  
35 longitudinal axis of the conveyor belt and the mantle surface of which is covered with a material having a high friction coefficient.

In a preferred embodiment of the device according to the invention, the carriers are arranged in pairs in the longitudinal direction of the conveyor belt on either side of the longitudinal axis of the belt.

5 Each holder is preferably formed as a U-shaped clamp, the basis of which is fixedly mounted on the conveyor belt and the protruding legs of which carry the cylindrical roller, so that this is rotatable transversely to the feeding direction of the conveyor belt. Preferably the  
10 conveyor belts, which can be comprised of roller chains, conveyor chains or belts, define an endless closed belt passing around a respective deflecting roller at the ends of the feeding device, the deflecting rollers being mounted in a support which is common to the conveyor belts and  
15 comprises driving means for at least one of the deflecting rollers for each conveyor belt.

The present invention further relates to a cable feeder comprising a feeding device of the above mentioned kind and intended for feeding a cable when winding a stator  
20 for electric machines.

The device and the cable feeder are, especially but not exclusively, intended to be applied when mounting high-voltage cable, on a generator where high-voltage cable is used in the windings of the stator, the cable lacking the  
25 outer protective cover normally surrounding such cable.

When mounting such a cable in the slots of a stator for an intended electric generator the cable laying has to be carried out with a "dead" cable, i.e. no torsional twisting at all or only very little torsional twisting of  
30 the cable is allowed when it is inserted in the stator slot. In particular the invented device is advantageous when used for an rotating electric machine of the type disclosed in WO-97/45919

The cable is preferably of the kind consisting of  
35 an inner core with a plurality of wires, an inner semiconductive layer surrounding the core, an insulating layer surrounding the inner semiconductive layer and an outer

semiconductive layer surrounding the insulating layer, preferably of a diameter of about 20 to 200 mm and a conductor area ranging from 80 to 3000 mm<sup>2</sup>.

5 **Brief description of the drawings**

A preferred embodiment of a cable feeder and the therein included feeding device according to the present invention will now be described in more detail with reference to the appended drawings, in which

10 Fig. 1 is a schematic view of equipment for mounting a cable in the stator slots of the stator for an electric generator, which equipment comprises a feeding device according to the invention,

Fig. 2 is a side view of the feeding device  
15 according to the invention, however, without the associated support, and

Fig. 3 is a section A-A through the feeding device in Fig. 2.

20 **Description of preferred embodiments**

When mounting a cable K in a stator S for instance for an electric generator according to the copending Swedish patent application 9700364-4 entitled "Method and device for mounting cables", equipment such as the one shown in Fig. 1  
25 is used. Said equipment comprises a winding machine 2 and two intermediate storage means 3, 4 by means of which the cable K to be mounted in the stator S is distributed to cable feeders A and B. In the exemplified equipment the cable feeder A is supported by a fork lift truck 1, which is  
30 movable on a floor surface recessed under the stator S, and the cable feeder B is suspended in a traverse or telpher 5 above the stator S.

Each of the cable feeders A and B includes a feeding device F according to the present invention for  
35 feeding a cable K towards, into and through the slots present in the stator S. To protect the cable K against sudden ruptures each cable feeder A, B presents guide

rollers 6, so that the cable K is given a suitable bending radius.

A preferred embodiment of the feeding device F according to the present invention is shown in more detail in Figs. 2 and 3.

In Fig. 2 the feeding device F is shown from the side and without the support 12, which is, however, illustrated in the sectional view A-A of the feeding device F shown in Fig. 3.

The feeding device F comprises two mutually facing conveyor belts 10, 11 assembled in a common support 12. The device is provided with a suitable driving machine 13 with associated control equipment 14. It is intended for the feeding of cable-shaped goods, especially in applications where the cable K has been subject to twisting in the longitudinal direction.

The feeding device is characterized by a high friction coefficient in the direction of feed P, in order to achieve a firm grip and reliable feeding of the cable K. Transversely to the direction of feed P the friction coefficient is low and may be considered negligible. With negligible friction transversely to the direction of feed, any twisting of the cable K in the longitudinal direction may be released. The direction of feed is optional, to the left or to the right as indicated by the arrows P in Fig. 2.

The conveyor belts 10, 11 are driven by the driving machine 13 via driving means not shown, which activate a respective deflecting roller 19, 20 over which the respective conveyor belt runs. The conveyor belts 10, 11 are endless and at the opposite end to the deflecting rollers 19, 20 are bent around another respective deflecting roller 21, 22.

The conveyor belts 10, 11, which can be comprised of roller chains, conveyor chains or belts, are provided with affixed carriers 15. At the carriers 15 there are mounted rollers 16 having a surface of rubber or similar material with a high friction coefficient. The rollers 16

are provided with hubs 17, preferably consisting of brass tubes. The rollers 16 are vulcanized or glued onto said hubs 17. In the hubs 17 of the rollers shafts 18 extend, which are fixedly mounted in a carrier 15 at each end of the shaft. The shafts 18 are parallel to the direction of feed P, making the rollers 16 rotatable transversely to the direction of feed P.

As is evident from Fig. 2, each carrier 15 in this embodiment comprises a U-shaped clamp, the basis 23 of which is mounted on the upper surface of the conveyor belt 11 and the protruding legs 24 of which carry the cylindrical roller 16 located between said legs in the above described way. The same conditions apply at the conveyor belt 10.

The cylindrical rollers 16 thus mounted on the conveyor belt 10, 11 are arranged in pairs on either side of the centre line L of the conveyor belt 10, 11 running in the longitudinal direction. The shafts 18 of the rollers 16 are parallel to the longitudinal direction of the conveyor belts 10, 11. During feeding of a cable K, said cable is inserted between the conveyor belts 10, 11 into abutment against the rollers 16 present there.

While the feeding device according to the invention has been described in conjunction with a preferred embodiment illustrated in the drawings, it will be obvious to a person skilled in the art that the feeding device may be modified in various ways without departing from the principle of the invention. For example, the carriers 15 may be formed differently from the U-shaped clamp shown. The conveyor belts 10, 11 may be supported by one or several support rollers located between the deflecting rollers 19, 21 and 20, 22 respectively. However, the scope of protection should not be considered limited to the above described embodiment only but comprises also modifications included in the definitions given in the appended claims.

## CLAIMS

1. A device for feeding elongated goods (K) such as cables, hoses and the like and comprising mutually facing feeding means (10, 11) arranged in pairs for grasping abutment against the goods to be fed, whereby each of the feeding means arranged in pairs is formed as a conveyor belt (10, 11) having carriers (15) so as to abut against the goods (K) as they pass between the conveyor belts (10, 11), **characterized in** that the conveyor belts (10, 11) as carriers (15) support two longitudinal rows of holders (23, 24) on either side of the longitudinal axis (L) of the respective conveyor belt, the holders (23, 24) supporting carrier means (16) for abutment against the goods (16) to be fed, and in that each carrier means (16) is formed as a cylindrical roller, the longitudinal axis of which is parallel to the longitudinal axis (L) of the conveyor belt (10, 11) and the mantle surface of which is covered with material having a high friction coefficient.
2. A device according to claim 1, **characterized in** that the carriers (15) are arranged in pairs in the longitudinal direction of the conveyor belt (10, 11) on either side of the longitudinal axis (L) of the conveyor belt.
3. A device according to claims 1 or 2, **characterized in** that each holder (23, 24) is formed as a U-shaped clamp, the basis (23) of which is fixedly mounted on the conveyor belt (10, 11) and the protruding legs (24) of which carry the cylindrical roller (16), so that the latter is rotatable transversely to the direction of feed (P) of the conveyor belt (10, 11).
4. A device according to any of the preceding claims, **characterized in** that each of the conveyor belts (10, 11) forms an endless closed belt running around a respective



deflecting roller (19 - 22) at the ends of the feeding device, the deflecting rollers (19 - 22) being mounted in a support (12) which is common to the conveyor belts (10, 11) and comprising driving means (13) for at least one of the  
5 deflecting rollers (19, 20) of each conveyor belt.

5. A device according to any of the preceding claims, **characterized** in that the conveyor belts (10, 11) are comprised of roller chains, conveyor chains or belts.

10

6. A device according to any of claims 1 - 5, **characterized** in that the cable is a high-voltage cable.

7. A device according to claim 6, **characterized** in that  
15 the high-voltage cable is of a kind including a core with a plurality of wires, an inner semiconductive layer surrounding the core, an insulating layer surrounding the inner semiconductive layer and an outer semiconductive layer surrounding the insulating layer.

20

8. A device according to claim 6 or claim 7, **characterized** in that the high-voltage cable has a diameter ranging from 20 to 200 mm and a conductor area ranging from 80 to 3000 mm<sup>2</sup>.

25

9. A cable feeder including a feeding device according to any of the preceding claims intended for the feeding of a cable (K) when winding a stator (S) for an electric machine.

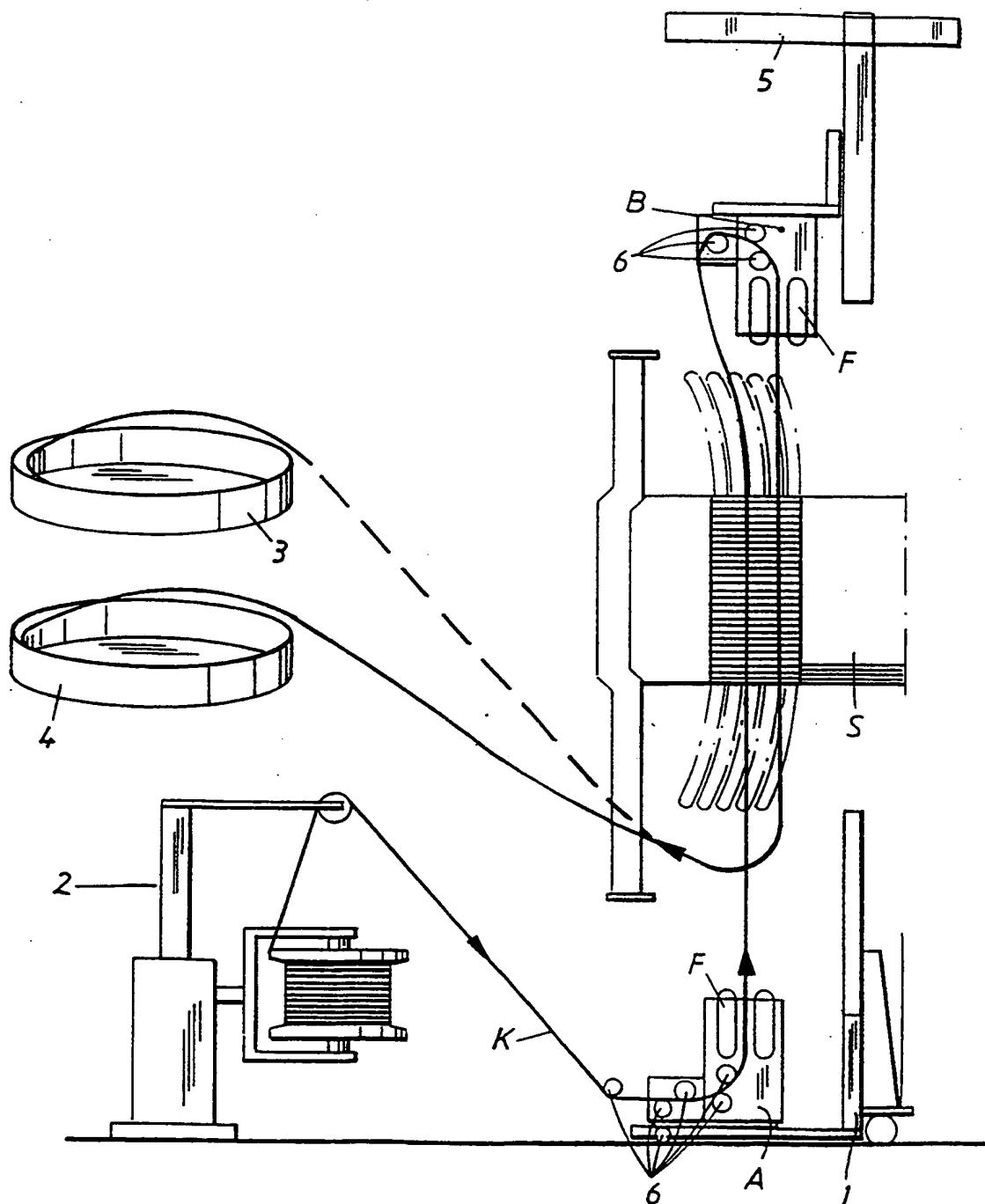
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Fig. 1



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Fig. 2

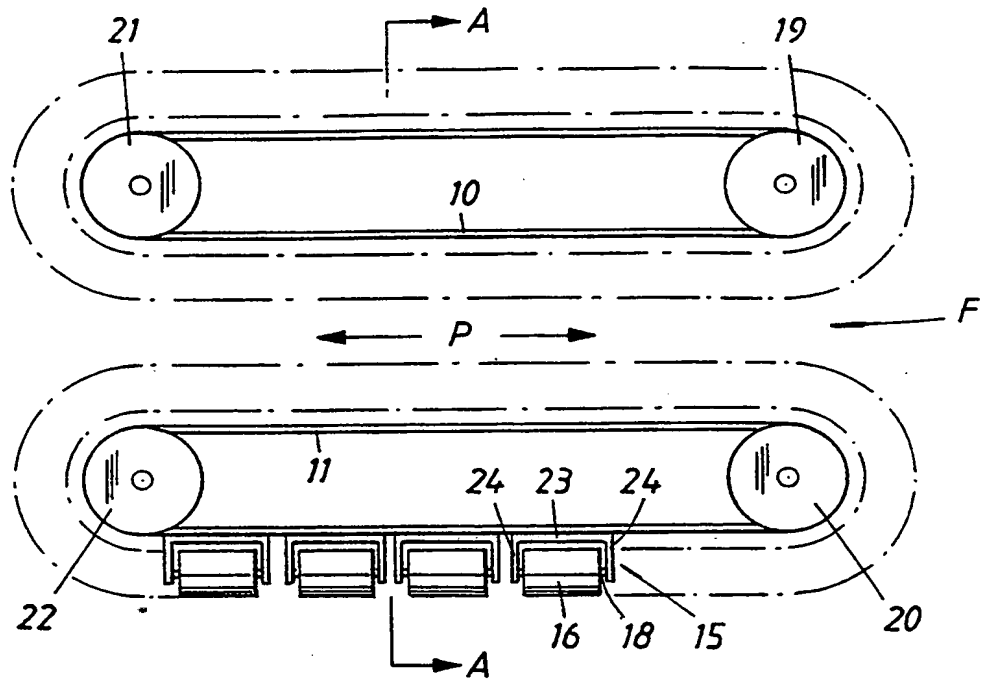
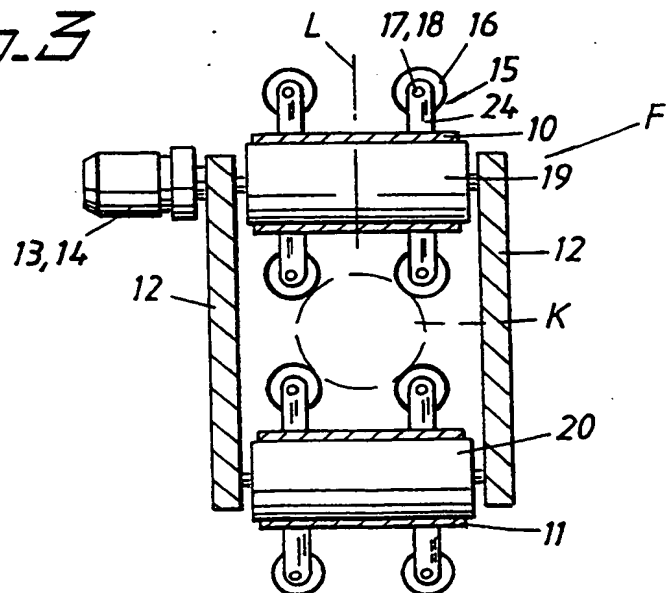


Fig. 3

A-A



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## INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 98/00172

## A. CLASSIFICATION OF SUBJECT MATTER

IPC6: B65H 1/14

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: B65H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 3143269 A (J. VAN ELDIK), 4 August 1964 (04.08.64) --	1-9
A	US 3881647 A (B.C. WOLFE), 6 May 1975 (06.05.75) --	1-9
A	US 2251291 A (L.O. REICHELTL), 5 August 1941 (05.08.41) --	1-9
A	US 1904885 A (G.A. SEELEY), 18 April 1933 (18.04.33) -- -----	1-9

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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US 3143269 A	04/08/64	NONE	
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